



## REMARKS

Claims 1-55 were examined and rejected. Applicants amend the specification; and claims 1, 8, 17, 19-20, 31, 33, 49 and 54. Applicants assert that no new matter is added herein as amendments to claim 1 are supported at paragraphs 35, 37, 39-41, 43-44 and 47-48; and **Figures 1, 4 and 8** of the application as originally filed; and amendments to the claim 17 are supported at paragraphs 36-39, 46 and 64-65; and **Figure 4** of the application as originally filed. Applicants respectfully request reconsideration of claims 1-55, as amended, in view of at least the following remarks.

### **I. Amendments to the Specification**

Applicant amends the specification to remedy various typographical and to preserve certain trademark rights. Applicant asserts that no new matter is added herein.

### **II. Double Patenting**

The Patent Office provisionally rejects Claims 1-4 and 6 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 25, 31, 33, 35 and 37 of co-pending Application No. 10/664,308. Applicants note the provisional rejection with appreciation and will address the above rejection upon issue of application No. 10/664,308.

### **III. Claims Rejected Under 35 U.S.C. § 103**

The Patent Office rejects claims 1-55 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,810,007 issued to Holupka, et al. ("Holupka"). To render a claim obvious, all elements of that claim must be taught or suggested by at least one properly combined reference.

Applicants respectfully disagree with the rejection above and submit that independent claim 1 is patentable over the cited reference for at least the reason that the

cited reference does not teach or suggest imaging a plurality of markers in a first imaging modality, the plurality of markers implanted in a body, as required by claim 1.

Holupka teaches localizing a position of the prostate for radiation therapy using a matching technique employing at least two points on an image obtained from transrectal ultrasound probe 12 inserted into the patient and an x-ray image (see col. 3, lines 50-67; Figs. 1, 2, and 9). In addition, Holupka teaches probe 12 mounted on probe holder 34 of couch mount 32, and couch mount 32 attached to the treatment table (e.g., table 44) to accurately and reproducibly position the probe relative to the radiation field isocenter, and to aid in positioning and insertion of probe 12 into the patient (see col. 6, lines 50-67; Figs. 1, 8, and 9).

However, the Patent Office has not identified and Applicants are unable to find any teaching or suggestion in Holupka of a plurality of markers implanted in a body. Specifically, Holupka teaches accurately and reproducibly positioning probe 12 by insertion of the probe into the patient (see col. 6, lines 50-52). Hence, for at least the reason that the cited reference does not teach or suggest the above noted limitation of claim 1, Applicants respectfully request that the Patent Office withdraw the rejection above of claim 1.

Dependent claims 2-16 being dependent upon allowable base claim 1, are patentable over the cited reference for at least the reasons stated above. Thus, Applicants respectfully request the Patent Office withdraw the rejection above for dependent claims 2-16.

Moreover, Applicants respectfully disagree with the rejection above and submit that independent claim 17, as amended, is patentable over the cited reference for at least the reason that the cited reference does not teach or suggest using a first imaging modality having an external source and a second imaging modality having an external source, as required by amended claim 17.

Holupka teaches transrectal ultrasound probe 12 positioned and inserted into the patient (see col. 4, lines 8-9; Figure 4; and col. 6, lines 50-58) and an X-ray image (see col. 3, lines 61-67).

However, the Patent Office has not identified and Applicants are unable to find any teaching or suggestion in the cited reference of a first imaging modality having an external source and a second imaging modality having an external source, as required by claim 17. Hence, for at least the reason the cited reference does not teach or suggest the above noted limitation of independent claim 17, as amended, Applicants respectfully request the Patent Office withdraw the rejection above of claim 17.

Dependent claims 18-20 being dependent upon allowable base claim 17, as amended, are patentable over the cited reference for at least the reasons stated above. Thus, Applicants respectfully request the Patent Office withdraw the rejection above of dependent claims 18-20.

In addition, Applicants respectfully disagree with the rejection above and submit that independent claim 21 is patentable over the cited reference for at least the reason that the cited reference does not teach or suggest filtering an image using a median filter, as required by claim 21. According to claim 21, for example, without limitation thereto, a median filter takes the median intensity values of perimeter pixels and subtracts the median values from the evaluate center pixel to output a filtered pixel intensity value (e.g., see paragraph 88 -89 of the specification as originally filed).

Holupka teaches automatically locating end point 20' and 22' using a conventional Hough Transform (see col. 4, lines 66 through col. 5, line 27).

However, the Patent Office does not identify and Applicants are unable to find any teaching or suggestion in the cited reference of using a median filter as required by claim 21. Hence, for at least this reason, Applicants respectfully request the Patent Office withdraw the rejection above of claim 21.

Dependent claims 22-27 being dependent upon allowable base claim 21, are patentable over the cited reference for at least the reasons stated above. Thus, Applicants respectfully request the Patent Office withdraw the rejection above for dependent claims 22-27.

Next, Applicants respectfully disagree with the rejection above and submit that independent claim 28 is patentable over the cited reference for at least the reason that

the cited reference does not teach or suggest performing the 2D size and shape consistency test of a region of interest of an image; and performing a 3D geometric consistency test of the region of interest, as required by claim 28. According to claim 28, for example, without limitation thereto, a 2D size and shape consistency test may be used to identify markers in an image (e.g., see paragraph 87 of Applicants' specification), and a 3D geometric consistency test may be used to identify markers in an image, such as by screening out false markers (e.g., see paragraph 93 of Applicants' specification).

As noted above with respect to independent claim 21, Holupka teaches using a Hough Transform to location points 20' and 22' on the simulator image.

However, the Patent Office has not identified and Applicants are unable to find any teaching or suggest in the cited reference of the above noted limitation of claim 28. Hence, for at least this reason, Applicants respectfully request the Patent Office withdraw the rejection above of claim 28.

Dependent claims 29-30 being dependent upon allowable base claim 28, patentable over the cited reference for at least the reasons stated above. Thus, Applicants respectfully request the Patent Office withdraw the rejection above for dependent claims 29-30.

In addition, Applicants respectfully disagree with the rejection above and submit that independent claim 31 is patentable over the cited reference for at least the reasons that the cited reference does not teach or suggest estimating an adjustment to at least one of the body and a treatment beam in a treatment session, based on a rigidity of the target and a number of visible markers in the image, as required by claim 31.

Holupka describes color washing a fusion image of anatomical volumes from the ultrasound image transformed to the simulator image. (see col. 5, lines 28-42). Holupka teaches using the color wash representation or other basic modes of utilization to calculate the area of the resultant radiation portal (see col. 5, lines 43-61), aid and development of an accurate treatment plan (see col. 5, lines 64-67), and adjust the size of the radiation field (see col. 6, lines 34-37).

However, the Patent Office has not identified and Applicants are unable to find any teaching or suggestion in the reference of estimating an adjustment to at least one of the body and a treatment beam in a treatment session, based on a rigidity of the target and a number of visible markers in the image, as required by claim 31. Hence, for at least this reason, Applicants respectfully request the Patent Office withdraw the rejection above of independent claim 31.

Dependent claims 32-41 being dependent upon allowable base claim 31, are patentable over the cited reference for at least the reasons stated above. Thus, Applicants respectfully request the Patent Office withdraw the rejection above for dependent claims 32-41.

Furthermore, Applicants respectfully disagree with the rejection above and submit that independent claim 42 is patentable over the cited reference for at least the reason that the cited reference does not teach or suggest estimating a number of positioning images needed for a treatment session based on the rigidity of the target and a number of visible markers in an image of internal markers in a target volume of a body, as required by independent claim 42.

As noted above with respect to claim 31, Holupka describes color washing a fusion image to provide certain benefits related to radiation treatment of a patient. However, the Patent Office has not identified and Applicants are unable to find any teaching or suggestion in Holupka of estimating a number of positioning images needed for a treatment session, or estimating the positioning images based on a rigidity of the target and a number of visible in an image of a plurality of internal markers, as required by independent claim 42. Hence, for at least these two reasons, Applicants respectfully request the Patent Office withdraw the rejection above of claim 42.

Dependent claims 43-48 being dependent upon allowable base claim 42, are patentable over the cited reference for at least the reasons stated above. Thus, Applicants respectfully request the Patent Office withdraw the rejection above for dependent claims 42-48.

Also, Applicants respectfully disagree with the rejection above and submit that independent claim 49 is patentable over the cited reference for at least the reasons that the cited reference does not teach or suggest means for imaging a plurality of markers in a first imaging modality, the plurality of markers implanted in a body, as required by independent claim 49.

An argument analogous to the one provided above with respect to independent claim 1 applies here as well. Hence, for at least the reasons that the cited reference does not teach or suggest the limitations of claim 49 noted above, Applicants respectfully request the Patent Office withdraw the rejection above of independent claim 49.

Dependent claims 50-53 being dependent upon allowable base claim 49, are patentable over the cited reference for at least the reasons stated above. Thus, Applicants respectfully request the Patent Office withdraw the rejection above for dependent claims 50-53.

Finally, Applicants respectfully disagree with the rejection above and submit that independent claim 54 is patentable over the cited reference for at least the reason that the cited reference does not teach or suggest a first imager coupled to receive the imaging beam, the first imager to image a plurality of markers, implanted in a body, in a first imaging modality, as required by independent claim 54.

An argument analogous to the one above with respect to independent claim 1 applies here as well. Hence, for at least the reason that the cited reference does not teach or suggest the limitations of claim 54 noted above, Applicants respectfully request the Patent Office withdraw the rejection above of independent claim 54.

Dependent claim 55 being dependent upon allowable base claim 54, is patentable over the cited reference for at least the reasons stated above. Thus, Applicants respectfully request the Patent Office withdraw the rejection above for dependent claim 55.

In addition, Applicants traverse that it would have been obvious to one skilled in the art that all the isocenters are correlated in order to create a common frame of reference and be able to fuse the images in guiding the therapy because otherwise there

would be no common frame of reference, and request that the Patent Office cite a reference in support of that position. (see MPEP § 2144.03). Specifically, as noted above, Holupka does not teach or suggest that ultrasound probe 12 has a beam isocenter.

Additionally, Applicants traverse that the use of pixel analysis to identify the markers as well within the knowledge of skilled artisans as a well known analysis technique to identify the area of interest, and request that the Patent Office cited reference in support of that position (see MPEP § 2144.03). Moreover, it is unclear to which of the Applicants claims and limitations thereof the above statement by the Patent Office applies.

CONCLUSION

In view of the foregoing, it is believed that all claims now pending patentably define the subject invention over the prior art of record and are in condition for allowance, and such action is earnestly solicited at the earliest possible date.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2666 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17. If a telephone interview would expedite the prosecution of this Application, the Examiner is invited to contact the undersigned at (310) 207-3800.

Respectfully submitted,  
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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail with sufficient postage in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P. O. Box 1450, Alexandria, Virginia 22313-1450 on August 19, 2005.

  
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Bernetta L. Higgins

August 19, 2005